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Emerging from Smoke and Mirrors

Lo Fu Tan

Abstract

Digital Health promises to transform healthcare in this decade. We have gone from “low tech” telephones, fax machines, dictation lines, desk-top electronic medical records, and data storage centers to video visits, texting, emails, smart phones and other mobile devices, and to higher forms including artificial intelligence, cloud data storage, and blockchain. However, letting go of legacy applications and then implementing the best available technology for clinical use has been challenging. This chapter will review the factors that contribute to the difficulty of moving from old to new tools. Specific examples will be video, electronic medical records and remote patient monitoring. The process of evaluating a new technological application will be described and a standardized framework proposed. We will finish with a discussion around local and scaled steps that can facilitate, support and sustain a patient-centered application of the best technology in healthcare. A call to action for the reader will be presented.

Keywords: digital tools, accessibility criteria, evaluation, implementation, strategic goals

1. Introduction

The experience of Healthcare is not pleasant. Accessing and navigating the system to receive timely care of high quality and affordable is not easy for patients. Cumbersome operational processes and inefficient legacy tools cause clinicians to waste time and promote burnout. Stakeholders- including payers and members, clinicians and their patients, industry, government agencies, and non-profit organizations- crave for a new paradigm that is smooth, seamless, and individualized. In 2020, technology was heralded as the means to make this happen by an end-to-end and fully integrated approach—all in a timely fashion under a viable business model that is cost-effective.

Despite the diversity of priorities amongst stakeholders, they can share a singular vision around technology. Digital Health, synonymous with Technology in Healthcare, is commonly defined as a convergence of digital technologies with Health, Healthcare, living, and society [1]. Furthermore, the author’s vision of Digital Health- a patient-centered application of the best available technology to further the Quadruple Aim of better patient experience, clinician engagement, affordability, and quality [2]- can undoubtedly be adopted by all users of Healthcare. The technology we are talking about are just tools to make Healthcare easier for everyone but always starting and finishing with the patient.

What is facilitating this drive for the digitalization of Healthcare? As a practicing family physician for over 35 years, this author believes that the phenomenon is mostly due to our inability to meet demand requirements. The general practitioner had it right by providing in-person care in the office or emergency department or hospital or home, wherever the patient needed it. This clinician knew the patient well due to 1:1 clinical encounters and continuity through follow-up, so it was very personalized. Care was relatively affordable as testing and treatment, and referrals and appointments were decided based more on the clinical necessity and less on profit and liability. However, the shortage of primary care physicians, even with nurse practitioners and physician's assistants, has resulted in the erosion of this relationship and the gold standard of care. Virtual ways of communicating and "seeing" patients, although not ideal, are practical and can help.

Even with the coronavirus pandemic, the healthcare system has kept consumer engagement a top priority though some would argue for the wrong reasons such as sustaining and growing membership. Many capabilities have been strained and changed, but on a positive note, Digital Health has been pushed to the forefront with its promise of being able to have a positive impact on Healthcare, care delivery, and, ultimately, health. At the beginning of 2020, we were doing national presentations on audiovisual visits to promote the value of this type of care, especially for those with poor access. In 2019, only 11% of US consumers had used telehealth, but this has skyrocketed to 46% in 2020 [3]. We all experienced the rapid adoption and growth of telemedicine out of necessity due to ambulatory care and hospital facilities limiting access, and reduced utilization from fear of exposure while at brick and mortar settings. Those with an established video care component had modest increases from 2019 to 2020. In our urgent care telemedicine clinic, which has been in existence since 2013, volume tripled, or increased year to year by 200%. Nevertheless, clinical groups who had done limited video care pre-pandemic saw unprecedented exponential growth. In our multispecialty practice, both primary and specialty care divisions had nearly a 20,000% increase year to year.

An audiovisual connection was unquestionably the most prominent example of a Digital Health tool used during this crisis. There are many others. Texting applications, especially around symptom-checkers, were introduced. Some focused on mental health for those that could do self-care. Surgical centers found excellent use to reduce physical contact with patients during pre-operative management and post-operative follow-up. In direct response to the pandemic, Covid-19 symptom checkers were distributed by CDC, individual payers, and provider groups. Employers have also been using customized versions for employee wellness and surveillance.

These are some of the countless technological tools that the health care system is deploying to improve the patient experience end-to-end. This effort preceded the pandemic, but it has become even more critical as direct, in-person contact is of clinical concern. The historical exponential growth of Digital Health in the technology industry accelerated in 2020 to unprecedented levels. It is much like the dot com era. Start-ups and established companies are professing to have the "solution" to a health care problem or case use through their software or "system" or "model." Worldwide in 2018, there were 318,000 mobile apps and 200 new ones per day [4]. These numbers have grown exponentially ever since.

A huge challenge for leaders in dealing with Digital Health is to figure out which technological tools to select. They have to decide if a device or application can perform as advertised. It is essential to determine if it will have an impact on the quality of care and outcomes. Affordability is always a concern too. Also, consideration must be given to legacy applications – are they worth keeping and integrating with the new? Or should they just be retired? While the first step is to find a reliable

and reproducible way to identify Digital Health solutions of high quality and value, a framework for implementation is essential.

The myriad of stakeholders may share a high sense of urgency about Digital Health, but each has distinctive priorities that make all of this difficult to put into practice. We need to try to move Digital Health hopes systematically from “smoke and mirrors” to impactful reality if we are to create a truly better healthcare experience and system for all. In this chapter, let us look at the challenges of the initial selection of technological solutions. Then we will introduce a scorecard as a good starting point for evaluating the technology’s quality. Next, a methodology is presented to measure outcomes. Finally, we will offer barriers to implementation, then some suggestions for a strategic framework.

2. The challenge

Dr. Eric Topol, who many consider being the father of modern Digital Health, presents Artificial Intelligence as a solution to make Healthcare human again. In his book *Deep Medicine*, he describes how technology can do this but warns that it will be a “marathon without a finish line.” He points out that this is mostly due to inadequacies of AI technology, both functionally and from the lack of evidence-based clinical outcomes [5]. This scarcity of proof is the main reason why healthcare decision-makers are reluctant to invest in the resources to evaluate and use new Digital Health technologies. Lim and colleagues did a survey of CEOs from startups regarding slow healthcare adopters to digital technology. All agreed that this was due to the asymmetric impact of regulatory pressures; that is, even if a Digital Health product met regulatory requirements, healthcare providers were reluctant to accept risk as there was no evidence to support outcomes. Another reason was the need for multidisciplinary buy-in from other stakeholders [6].

Cost issues due to prior investment and ongoing maintenance of existing technological applications likely play a role. Most organizations have not done reliable cost analysis studies. When we have looked at this informally within our national organization, retiring legacy applications that were not needed or not useful lead to substantial overall one-time and annual cost savings even with the added expense of new solutions.

To illustrate the current “standard” evaluation process, we want to share three examples of technology used in our practice. These are not unique as there are many similar scenarios in other healthcare systems. Video for direct patient care is spotlighted since the pandemic has pushed it to the forefront. We have had urgent care video visits for years. Still, our established platform was not easy to apply in specific case uses- poor connectivity in hospital and home, difficulties for the patient to create an account, benefit confirmation, and navigating the application. The offshoot has been superficial and informal evaluation then rapid implementation of many other video platforms. Well-intentioned champions lead these on a case-by-case needs basis, and none were adequately studied. The result is a host of video applications, multiple contracts, patient and clinician confusion and frustration over many duplicate tools. The “back up” applications (which some intentionally use as their primary ones) are meant for social media and not safe medical use. We have quadrupled the number of video applications in our multispecialty group, and there does not appear to be an end in sight. The approach is straightforward: solve the problem in isolation, and no matter what device is needed, get it, and put it into production.

Another example centers on getting more value out of video visits. These typically do not include vital signs, exam modalities, and post-visit testing like a

laboratory. We have an in-house kit that has been used for years to do remote patient monitoring on chronic patients like those with congestive heart failure. It contains blue-tooth enabled tools and a phone-linked tablet. The patient takes their blood pressure, weight, oxygen saturation, pulse, and temperature, with results automatically uploaded from the tablet to the company's web dashboard. We have modified it to meet our episodic need for vital signs before a scheduled video visit or to follow labile patients like those with uncontrolled hypertension over a few days. The patient can efficiently perform self-directed vital signs, uploaded to the provider's Medical Assistant, who then transcribes the data to the patient's EMR. A phone call then connects the patient at the pre-arranged time for the kit's video visit.

Concurrently, two other tablet devices are being tested by our national provider organization even though the first tablet with the Blue-tooth enabled vital signs tools appears much easier for the patient and physician to use. These other two do not have Bluetooth-enabled vital signs tools, so manual ones are delivered simultaneously as the tablet. We are currently comparing the three devices, but this is not being done in a formal, systematic way. An important point here is that the delivery means and organizational process, cleaning, and repacking are similar no matter the device used. The cost of the tool and how it performs are the main differentiators. Of course, politics too. One of our sister care delivery organizations has seen excellent results using one of these devices in engaging seniors at home and at the curbside, which has led to significant gap closure of population health measures. An outside vendor is offering this one. The other two belong to our company, which means a financial impetus to develop new case uses.

Another company's video option is the cheapest via a supplemental monthly physician subscription fee, easiest to scale, and already shown to work well. We have used their core function of texting between providers for years. They quickly developed secure, compliant, and high-quality connectivity to patients via texting and audiovisual, which allowed many case uses, including visits with patients in Skilled Nursing Facilities (SNIFs), home, and the curbside. It is as simple as texting the patient with an invitation to connect for an audiovisual visit on their smartphone or other connected devices. Naysayers question whether or not patients have access to their own devices capable of reliable audiovisual connectivity. Our surgical centers have been using this and have found that 75% of seniors have reliable personal mobile phones. We are still piloting three tablets, which are more expensive, not as easy to use, and possibly not scalable.

Our care delivery organization has had an Electronic Medical Record (EMR) program for nearly 20 years. With the overall goal of improving communication between patients and colleagues, we have contracted with the EMR vendor to add other components of a patient management solution- a patient portal, a program for scheduling, and video and texting applications. Another national vendor has the video platform that we have used for many years. It, too, is quickly adding other communication modes- texting and a stand-alone mobile video application. While both vendors appear to have solutions for comprehensive virtual care and communication, we have not been afforded the chance to test them. There also have been limited learnings from real clinical settings. Much of the vendors' offerings are still being developed. Even if a preliminary look is optimistic, we will have to spend time and money on further development and testing to end up with a final customized tool.

We recently started a pilot looking at a third option. A global tech company has a comprehensive communication tool that is easy to use, inexpensive, and customizable. We are looking to see if it can streamline connectivity between clinicians and staff, improve patients' experience doing video visits and scheduling, and allow easy connection to patients in the community. For example, hospitalized patients

need a discharge “navigator” to coordinate care and follow-up and better medication adherence through real-time reconciliation to reduce Emergency Department visits and re-admissions. We are facing two stumbling blocks with testing- lack of access to the full functionality of the software and no workforce dedicated to conducting most pilot components.

What drives a tool’s incorporation into a trial or pilot? It should always begin with a clinical or health care need or problem, or a case use that a technological tool or solution can help. Next, the device must meet all “Availability Criteria”- technologically sound- meaning that it works the way it professes to, is easy to use, is scalable, is customizable, and is affordable. Now it could move on to the pilot step for testing in a live environment. These examples of devices have not met the necessary criteria but are in pilots or have already been put into use.

Subjective business decisions made in isolation are often the culprit. The goal of getting to one EMR across many provider groups is appropriate. However, technology leadership is singularly focused on this directive and not properly vetting the vendor’s ability to deliver and support the tool’s capabilities, functionality, and need for development. Deadlines are missed, and costs are exceeded. Still, worst of all, the solution may never get to intended production.

We have many corporate leadership examples, seeing “the next best thing to come in Digital Health.” A tool is quickly given capital support from the company or is acquired. Advocates demand quick implementation of the device. Often, it has no explicit end-user use, has not passed the five Availability Criteria, nor has it been shown to improve outcomes in formal pilots.

We see this coming from many other non-clinical divisions. The marketers who have historically been given Digital Health leadership roles love tools to enhance patient experience via the internet. The technology leaders find or create tools that they can solve problems with from their technological perspective. Neither group engages much with clinicians to determine their initiatives’ implications on patients, providers, care, and outcomes.

So, we do not have an excellent way to evaluate the technology. Validation requires that we study the technology and potential outcomes. First, though, a problem is identified as the reason for trying out the technological solution.

Case uses can be about a specific problem or very broad. They can be for clinical or non-clinical. Short-term or long-term. Patient-specific or physician-specific. Provider System or Payer. It is easy to add in others. **Table 1** illustrates some examples. These case uses should be compatible with the vision and strategic goals of Digital Health and the overall organization.

Case Use	End User		
	Patient	Physician	Payer
Easy communication	X	X	X
Improved medication adherence		X	
Reduce ED utilization and readmission	X	X	
Front-end connection to system			X
Appropriate specialty referrals		X	X
Reduced EMR clicks		X	
Real-time data for CDS		X	
Shared data	X	X	X

Table 1.
Examples of end-use requirements or case uses.

3. Validation of digital health

Any method should take into consideration all five of the Availability Criteria of a technological tool. The Global Score of Mathews and his colleagues shows promise. The authors have completed a thorough review of the current state of validation of Digital Health. They feel that stakeholders have low confidence in Digital Health solutions due to a lack of an objective way to evaluate products. They propose an end-user requirements approach assessment across the four technological, clinical, usability, and cost domains. Their Digital Health Scorecard incorporates these four criteria, which they aggregate into a composite Global Score. We are presenting this as a means to determine the gross initial selection of Digital Health solutions. Individual scores can allow sufficient discrimination of particular products, identify where improvements are needed or gaps, and compare similar Digital Health solutions [7]. Focusing on a few is imperative as resources are usually scarce.

The Global Scorecard uses a multi-stakeholder approach that purportedly can objectively and rigorously evaluate solutions. It is comparable to methodologies used outside of Healthcare (such as Underwriter's Lab, which develops safety standards and uses pre-market testing, and Consumers' Reports, which relies on post-market evaluation). It appears flexible and dynamic enough to meet the demands of multiple stakeholders. For example, payers want more efficient use of resources, whereas providers want increased reimbursement. The current scorecard uses end-user requirements to determine the maximum impact on patients. This approach can be transparent, thorough, and standards-based [8]. It is currently being tested for validity in different studies.

4. Quadruple aim-based outcome measures

A formal pilot to assess technology is essential before a full launch. Measures of outcomes need to be created to determine how well the solution performed, especially regarding helping solve the problem for a specific case use. From the author's Digital Health vision to help achieve the Quadruple Aim, let us see how we might use this to formulate our outcome measures. Dr. Don Berwick and his colleagues introduced the Triple Aim to improve the patient's care experience and populations' health and reduce costs to improve the US Healthcare System [9]. This evolved into the Quadruple Aim as the importance of caring for the provider was acknowledged. Many health care organizations have adopted the four aims as their overarching goals. There has never been an impetus to rank them. However, without patients, the health care system would have no reason to exist. Even if quality and patient satisfaction are outstanding, cost-prohibitive care and a lack of clinicians or staff due to low engagement will lead to a model that could not be sustained. The prevailing priority is to improve the patient and clinician experience, hopefully leading to better clinical quality and cost control.

Concerning patient satisfaction, surveys are the means to collect data. Overall, questions are not specific enough, so we need more directed ones that tie back to case uses. Patients are now also customers and consumers. They want to interact with the health care system as they see fit, not just by the traditional telephone call and in-person visit, which involves a process that is not easy to use. They want to engage using virtual tools like audiovisual connections, texting, and e-mailing. They want to be able to self-schedule. They want to get referrals, tests, results, and prescriptions quickly. Price transparency is essential too. Finding tools that can achieve these wishes is our mandate.

Physician Engagement starts with ways to improve the EMR so that there are fewer clicks, less need for brain power and time, and better workflows. Frustration over the EMR has directly contributed to the burn out of providers and staff who are less caring and less careful, directly impacting the patient experience and clinical care quality. There is less attrition of patients, physicians, and staff when they are satisfied and engaged. Human capital groups agree that it costs nearly \$1 M to replace a physician throughout the healthcare system. We do not know the effect of turnover on patient satisfaction and quality of care, but both are likely reduced.

Quality in Medicine has always been about clinical criteria- the quality of life, reduced morbidity, and reduced mortality. The Quadruple Aim's focus, however, is on the overall health of the population. Historically, this was under the purview of Public Health and Preventive Medicine but has morphed into its own Population Health discipline. Measures created by government agencies in collaboration with payers, provider groups, and academic institutions are geared towards payment and are only indirect measures of quality of life, morbidity, and mortality.

Cost considerations have evolved over the years, going from dollars adjusted for inflation to Cost-Effectiveness to Return on Investment to Medical Waste calculations. Value-based care, coupled with Evidence-Based Medicine as a core component of decision-making, has gained enormous popularity since it is a useful cost control model. The hope is that this approach will significantly impact the estimated 1/3 of all medical costs being spent unnecessarily in the USA.

For any of the four Quadruple Aim goals, investigators can create specific outcome measures for a pilot. Financial Analysts must choose newer and more innovative ways to factor in non-monetary benefits. For example, engagement leads to better care, less morbidity and mortality, less attrition of patients and providers and staff, more retained, and new patients. A surrogate measure might be non-productive patient time for travel, waiting, and going to the pharmacy. Alternatively, for a physician, measure time to chart in the EMR, lost productivity due to missed appointments from no-shows, and face-to-face time with a patient.

5. Letting go

Letting go of legacy applications or figuring out how to integrate them with new technology is a challenge. Our leadership contracted with the EMR vendor with minimal clinician input. Over the years, albeit not unlike most EMR applications, it has not come close to meeting our providers' and staff's expectations. It is not agile nor easily customizable. Only one user can get full functionality on a patient chart at any one time, although a workaround has allowed for limited simultaneous access. It takes multiple clicks to complete a repetitive task, like entering an electronic prescription. Most frustrating for all is that the responsiveness from the vendor to technological issues is insufficient. In part, our organization is responsible for this since we decided to have extensive home-grown IT and CAS groups to manage this EMR for customization and cost-saving. The result forces the clinician to work for the computer rather than the computer working for the clinician. Despite these concerns, it has become the go-to EMR in our region. This vendor has also entered into the patient management product lane by introducing its patient platform, a scheduling application, and patient communication solution, including video and texting. This process has been three years in the making, but out-of-the-box baseline functionality is low, and much of their solution requires ongoing development.

There are practical concerns about retiring this EMR. We have used it for nearly two decades, and moving to another may not make things better. The cost of starting over is a primary issue. Another important consideration is that the ends justify

the means- going to a single or limited number of EMRs in a region makes sense from data access and sharing perspectives, and cost. Doing this without making sure that the product meets all five Availability Criteria- does the technology do what it professes? Is it easy to use? Customizable? Scalable? Cost reasonable?- makes no sense. An appropriate comparative analysis looking at other EMR products should be done. Considering novel approaches such as a front-end wrapper might be worthwhile. Foundational applications from companies with such expertise are more likely to be readily available and not require the cost and time of development we are experiencing.

Letting go also encompasses the siloed approach to Digital Health that has plagued organizations for years. Modern-day Digital Health began its foray into health care 20 years ago with marketing teams looking at the internet and consumers. These groups continue to champion customer experience and end-to-end service. They work diligently to use technology to connect with consumers and patients to receive an outstanding experience similar to other thriving service industries. While they do look at end-user requirements or case uses, these are typically non-clinical. Technology groups do the same from their narrow application perspective. Success for them is in the implementation of a solution and making it work based on technical specifications. Again, consideration of clinical end-user requirements is often an afterthought. Business and financial groups do similar isolated Digital Health work to get data for operational efficiency reasons. Both payers and providers have marketing, technology, business, and finance divisions doing comparable work in their parallel silos. Finally, the payers and the clinical groups look at Digital Health from their relatively narrow perspectives. If all of these groups could collaborate and communicate effectively, share tools and data and resources, and agree on end-user requirements or use cases, we would be much further ahead in achieving practical evaluation and implementation of Digital Health tools.

6. Implementation: towards a strategic plan

Mathews and his colleagues address organizational factors by suggesting that there is no single owner of a Digital Health solution requirement, making it challenging to come up with a scorecard that all would embrace. They state that there are no known optimal requirements due to so many new Digital Health applications. It is hard to determine which stakeholder should take ownership of driving the requirements. We propose that the lead be a blended payer-provider one. This dyad could fulfill the role of the primary owner. Cogan et al. suggest that a collaborative effort between a payer and provider for health IT can be successful by sharing tools and tactics leading to technological systems' interoperability, agreeing on clinical goals and quality measures of outcomes, and sharing data from standard quality measurement tools [10].

A dyad ought to follow these recommendations.

Operationally, Mathews and colleagues feel that it is not practical to vigorously evaluate more than a few Digital Health solutions at a time, which makes a scorecard more justifiable for high-cost conditions or those in peer-reviewed studies for validation purposes. They wonder if the industry should not self-evaluate. How likely will they take this on as it would be both expensive and time-consuming? Do any of the other stakeholders want this coming from the industry instead of a more objective source?

Mathews et al. correctly propose that what is essential for the future are resources, collaboration, and time to validate the Digital Health Scorecard and needing input from all stakeholders to align financial incentives to outcomes appropriately. They

propose that governmental regulatory bodies and provider health systems lead this. However, they point out that nontraditional players may do better, e.g., CVS and Aetna, Amazon-JP Morgan Chase-Berkshire Hathaway. Even so, these entities are missing knowledge and experience from a critical group, the clinicians.

Stotz et al. interviewed a group of “Next-Generation Payer and Providers (NGPPs)” who have payers and clinicians collaborating effectively: Alignment Healthcare, Clover Health, CareMore Health, Iora Health, and Oscar Health. These payers have new payment models that redefine how patients interact with their health plans. Providers or clinicians are on value-based payment models, engaged in upstream clinical monitoring, focused on primary care, and committed to population health. These NGPPs consider technology to be the key enabler of their innovative approaches, including predictive analytics, price and outcome transparency, on-demand care via telemedicine, and AI for care decisions. Key learnings from these NGPPs: use technology to enable more person-to-person interaction, either co-develop or buy from the technology company but not both, use real-time data to support decision making, consider Remote Patient Monitoring for home-based care but know that the technology is not currently easy to use and validation is lacking, and give consideration to creating beta-testing clinic sites for pilots [11].

Any implementation framework should include the concurrent evaluation of existing and new technological applications for specific case uses. An end-user requirements approach and a combined Global Score, followed by a Quadruple Aim-based outcome analysis, is ideal. The result would be a set of data-driven recommendations for review.

The final decision regarding tool selection should be made easier by the process I have described. Who will make this determination? As we are using these technological tools to solve problems that span Health and Healthcare, the input from multiple stakeholders would be invaluable- Digital Health, Technology, Marketing, Finance, Medical Management, Population Health, Legal, Human Resources, Patient Experience, Providers and Payers. All parties should have been involved from the beginning and through to the end of this collaborative effort. A consensus supported recommendation would go to an “executive board” made up of the Digital Health business and clinical leaders, CMIO, CMO, and CEO for final ratification. Evidence-Based Medicine (EBM) is an excellent model to follow, in which the best available research evidence forms the core of medical-decision making. However, EBM is not perfect since we lack good research evidence for the testing and treatment standards of many of the medical problems we face. In part, this is why we have a pyramid from a base of little evidence that uses expert opinion in the form of guidelines up to the peak with meta-analyses.

So, where does this leave us? Recall that Evidence-Based Medicine is not just about the best available research findings. David Sackett reminds us that it must include the addition of clinician experience and the patient’s input [12]. This is consistent with Medicine being an art. That collaboration between patient and physician is a crucial component. The process of technological tool evaluation is similar. It is also an art that uses facts based on Digital Health Scorecard results, Quadruple Aim-based measures to assess pilots’ outcomes, and the best available experience, then getting input from all stakeholders for the best decision.

Evaluation of the technology is about the standards to follow for the innovation and change that will come as part of an overall Digital Health strategy. Other strategic goals directly impact standards and need to encompass organizational and operational leadership and governance, investments, and workforce. There should be a means to approve and conduct pilots across different ecosystems while providing advisory and consultation support. Digital Health leadership would have much input into the sustainability, spread, and scaling of successful innovations.

Selecting a method for evaluating Availability Criteria, then the value of a tool through Quadruple Aim-based outcome measures is a vital strategy responsibility. Collaboration with clinical partners in the organization to get buy-in to positively affect workflows, time, expenses, and integration, while dealing with unintended consequences, e.g., expectations regarding higher standard of experience with virtual communication. Leadership would have input into payment model design for new care models to improve the patient experience while meeting both payer and provider financial expectations. A key role would be to formulate a plan to place technological applications into the community for population health interventions. The strategy should look at the social determinants of health to use technology to alleviate those detrimental factors to access and clinical outcomes.

There are no excellent established value and impact-based business models for Digital Health. Next-Generation Payers and Providers (NGPP) may be a good starting point since a provider stakeholder is directly involved. These companies were created to deliver a re-imagined service to patients, prioritizing health, and outcomes over utilization. The onus is not placed on the consumer or patient. The payer and the provider have direct risks and ultimately share responsibility for the customer and patient's health and care and Healthcare.

As a starting point, any Digital Health's strategy should consider short-term goals for both the consumer and the stakeholders. We all want our members and patients to have convenient, safe, effective virtual care. Both payers and providers see the value in doing a better job at managing chronic conditions, improving medication adherence, and reducing unnecessary emergency department visits and hospital admissions. Focusing on the elderly and the poor and the disadvantaged racial groups and those social determinants negatively impacting health is vital. Directing patients toward timely and appropriate care at the right location can begin today. Finally, we can use Digital Health tools to facilitate looking after the whole person's overall health [13].

Drury et al.'s working paper on investing in Digital Health provides a guide on how to think about the process. It can help put together the data needed to allow for a well-informed investment decision through the Digital Health Impact Framework (DHIF Appendix 2 pp. 56–59). The DHIF includes a list of crucial questions for each stakeholder to consider:

1. What is the social and political context? Is there the will and finance to pursue a good case through to implementation?
2. What are the options, including possible public-private partnerships?
3. Do the options fit with health, health care, and Digital Health strategies?
4. What are the intended and probable results, and how long will it take to realize them?
5. What are the priority investments planned, their cost, and how do they help achieve the intended and probable results? This stage can make use of modeling tools for assessing cost and benefits over time and should address: (i) How and when will benefits be realized; (ii) Required results of the preferred option that has the highest priority to be achieved; (iii) Estimated costs and benefits for each stakeholder type; (iv) Estimated monetary values of the benefits; (v) Socio-economic returns for each option and their adjustments for sensitivity, optimism bias, and risk exposure; (vi) How risks will be mitigated; (vii) How and where services will be delivered; (viii) Focus of services; and (ix) Life cycles, affordability of options.

6. What are the priority actions within the resources available?

7. How will the results be monitored and evaluated?

In building the investment case, it will be important to show that:

- i. The proposed initiative is needed and fits well with other relevant strategies.
- ii. It represents value for money.
- iii. It is commercially viable.
- iv. The main investors, who may not be the direct beneficiaries, can afford it.
- v. It is achievable.

A means to measure, monitor, and improve performance is mandatory. The Digital Health Impact Framework's (DHIF) consistent methodology provides an appraisal of estimated costs, benefits, net benefits, the socio-economic returns, and financial affordability over time of individual digital health projects. It enables bespoke appraisals that can be aggregated to help leaders and planners to:

(i) Understand and develop the socio-economic and financial aspects of their digital health strategies, modify them as needed, and (ii) Make informed investment decisions for sustainable digital health programs and projects.

DHIF is a proven methodology used in over 60 evaluations. It starts by setting a timeline that broadly matches an investment's life cycle. Then, researchers can prepare assumptions and estimates of types of users and stakeholders for each year. DHIF should include estimated changes from Digital Health projects, such as healthier citizens and communities, and more appropriate health care utilization. These arise from Digital Health's impact on patients, care providers and citizens, health workers, and health care organizations.

Drury et al. also propose that for any implementation to be successful, while leadership is the key, investment is necessary. This investment must come with clear justification by understanding the context and process for such investment decisions. Success also depends on better data management, including integrating and sharing data, agreement on policies and standards, good security, and all stakeholders getting needed resources. They felt that most digital health investment decisions would do well financially concerning affordability and return on investment and support the workforce population's overall productivity in general.

Here are the important components for strategy from Drury et al. [14] (Author comments have been added):

Leadership and governance- (to identify the preferred leadership and governance model), the collaboration between clinical and business sectors is vital. We favor a dyad that would direct strategic planning and implementation. Each partner comes with unique training, experience, knowledge, and skills to positively impact the Digital Health program. However, governance must include other stakeholders: payer, clinicians, patients, technology, marketing, finance, and patient experience. Success depends on full collaboration and cooperation, which must be a high priority and responsibility of these two leaders who have authority at an executive and enterprise-wide level.

Strategy and investment- (to produce a description of the Digital Health strategy and investment components required to support the development and operation of

the program) Drury et al. have four key focus areas which we believe should guide all strategic and investment goals:

1. Foundations- Digital Health components that will allow the sharing of information/data.
2. Solutions- Digital Health components that access and interact with, and use foundations to access and share information.
3. Change and Adoption- motivate and support the health system, establish incentives, and identify changes needed in work practices.
4. Governance- coordination, visibility, structures, and mechanisms for accountability and effective leadership.
5. The strategy includes developing a business plan to justify and follow progress that is built-in. It needs to include a framework for where to start, what technology to evaluate, and how to do this, an implementation plan, resource and workforce needs, and associated costs. Sustainability must be considered- what is needed to maintain and upgrade, re-evaluate, conduct ongoing pilots, adjust to innovation, and change strategy. Ongoing evaluation is required, which demands executive authorization of resources for all stakeholder groups.
6. Services and application- (to produce a description of Digital Health service and application components required to deliver outcomes described by the initial vision) Need to decide who should maintain the technology and who should deliver and support the clinical service. Delivery of the clinical service needs to be addressed.
7. Infrastructure- (to produce a description of Digital Health infrastructure components required to support Digital Health services and application components). You need to select a connectivity platform from an established technology company with resources and know-how.
8. Standards and Interoperability- (to support Digital Health service and application, infrastructure, and health information flows). The current chapter's focus.
9. Legislation, Policy, and Compliance- (to produce a description of Digital Health legislation, policy, and compliance components required to develop and operate the Digital Health program) Cyber-security is vital.
10. Workforce- (to produce a description of the Digital Health workforce required to develop, operate, and support the Digital Health program) skilled and matrix management ready.

7. Conclusion

“Smoke and Mirrors” aptly describes the current state of Digital Health. To make it smart and pervasive, we need a way to validate Digital Health tools. Start with a particular case use or problem needing a technological solution. Next, using a Global Scorecard, determine if Availability Criteria are met. See if it genuinely helps the case use or end-user requirement by conducting a pilot to report outcome

measures from the Quadruple Aim. Using an implementation framework within the context of an overall Digital Health strategy led by a payer-physician dyad, a formal set of findings and recommendations can be presented to executive leadership. All are charged with supporting the final decision as a Digital Health program's success depends ultimately on taking timely and appropriate action.

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Conflict of interest

None.

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